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(54) **Moulded plastics pipe connector.**

(57) A moulded plastics pipe connector comprises a tubular body (1) arranged to receive an end portion of a flexible corrugated tubular conduit. A sprung catch on the body, for retention of the inserted conduit, comprises a finger (10) which extends axially on the body within an opening (9). The finger is connected to the body, adjacent to an open end (7) of the body, by lateral mounting elements (15). A free-end portion of the finger comprises an inwardly-directed projection (12) arranged to engage behind a ridge on an inserted conduit to retain the conduit. The finger is resiliently displaceable, to allow insertion of the conduit, through elastic torsional strain in the mounting elements (15).

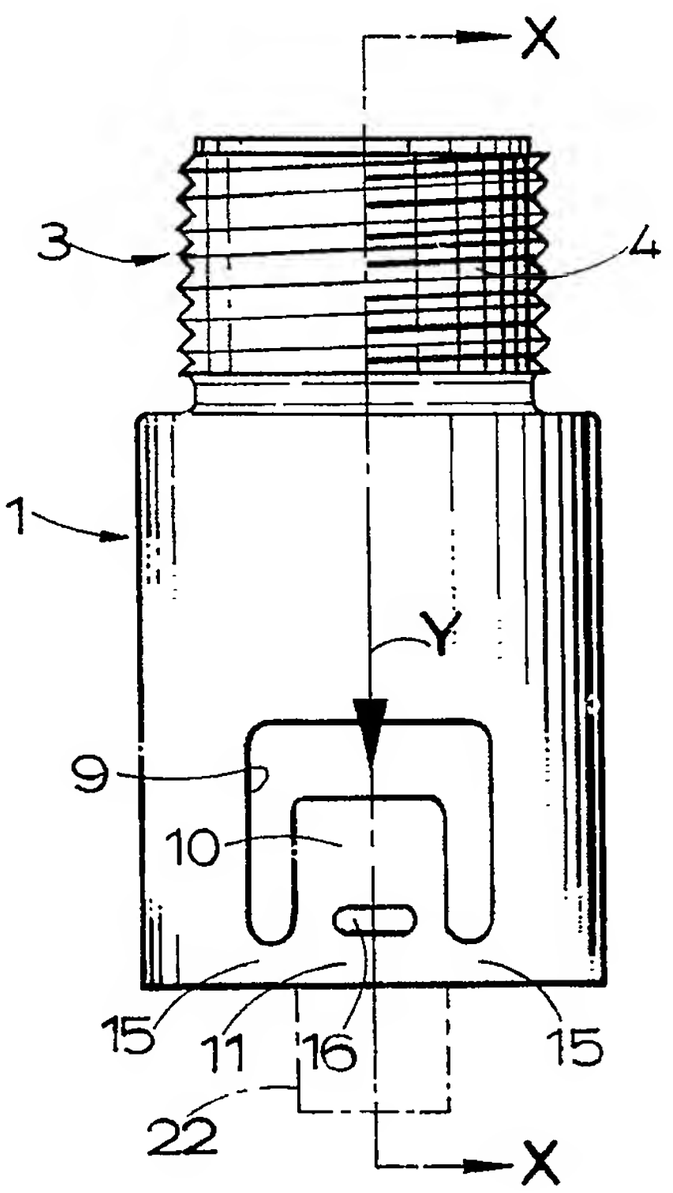

FIG.1.

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MOULDED PLASTICS PIPE CONNECTOR

This invention relates to a moulded plastics pipe connector for fitting to an end portion of a pipe and comprising a tubular body arranged to receive the pipe and at least one sprung catch arranged on the body to engage the pipe for retention of the pipe, the sprung catch comprising a finger presenting a free-end portion which is resiliently displaceable radially of the body and which bears a projection for engagement behind a circumferential ridge of the pipe to lock the pipe into the connector. For example, such a connector may be for joining to the end of flexible corrugated tubular conduit such as is commonly used as trunking for electrical wiring. A number of known connectors utilise sprung catches which comprise resilient fingers having projections to engage in a corrugation valley of the pipe to prevent withdrawal of the pipe. The fingers in these known connectors undergo resilient beam deflection during insertion and removal of the pipe, and/or a line of weakness may be utilised to facilitate the resilient bending of the material at a root portion of the finger. Examples of such known connectors are disclosed by WO 87/04767 and EP-B-0 046 616.

Sealing means may be incorporated in the connector to seal between the pipe and the connector.

Such known connectors used with corrugated conduit have a number of disadvantages. A common problem is that the catches are either too weak to retain the corrugated conduit in position against a high pull-off load or they are strong enough to retain the corrugated conduit but instead the fingers are too stiff to allow the conduit to be pushed easily into the connector.

With some known connectors it is difficult to displace the finger to allow removal of the conduit from the connector if it becomes necessary to disassemble the connection.

Problems can also be encountered in using known catch designs in larger connectors (e.g. having a diameter of 5cm or more) or where the conduit is of a ductile plastics having a low coefficient of friction.

A connector according to the invention is characterised in that a root portion of the finger is connected to the body by means of lateral mounting elements which provide for the finger to be resiliently pivotable about a transverse axis through elastic torsional strain in the elements.

The finger may be accommodated within an opening in the tubular body. In that way, the body may define a smooth bore to receive the pipe, interrupted only by the projection on the finger.

Ordinarily, for best effect, the finger extends from its root portion to its free end generally axially of the body. However, in some circumstances it may be found advantageous to align the finger otherwise. The root portion of the finger may be positioned at or adjacent to an open end of the tubular body through which the pipe is to be introduced, the finger extending along the body in the direction away from the open end.

The sprung catch can advantageously comprise an extension portion which extends from the root portion of the finger in the direction away from the free-e nd portion bearing the projection; this can enable the finger to be pivoted, to move the projection outwards, by exerting an inwardly directed force on the extension. Such provision for pivoting the finger may facilitate both assembly and disassembly of the connection, particularly with large diameter pipes.

Advantageously the connector may be provided with a plurality of such fingers distributed around the bore.

In a preferred form the connector as a whole is made as a unitary moulding of a plastics material. Alternatively the catch, comprising the finger and the mounting elements, could be made as a separate unitary moulding to be secured to a moulded body.

Nylon 6 can be a suitable plastics material for use in moulding the connector. Advantageously, with larger pivoting movements torsional stress at the mounting elements may cause the material of the elements to enter a viscous range; accordingly the finger would remain in its pivoted-out position until positively returned to its normal position. This can enable connections to be easily made or unmade. In some embodiments, particularly those with large diameter connectors, the connectors may be supplied with the fingers in a pivoted-out position.

The invention takes advantage of the relatively low transverse modulous of elasticity (G) of suitable plastics materials (as compared with their Young's modulous (E) which would determine their performance in beam deflection) in mounting the fingers by means of the torsion elements.

An embodiment of the invention will now be described, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a side view of a connector in accordance with the invention;

Figure 2 is an axial section through the connector on the line X-X of Figure 1;

Figure 3 is a scrap view of a finger of the connector; and

Figure 4 is a top plan view of the finger in the

direction of the arrow Y of Figure 1.

A one-piece plastics pipe connector comprises a tubular body 1 defining a stepped bore 2. A forward end portion 3 of the body forms externally-threaded connecting means 4 to enable the connector to be coupled to another body. (In other embodiments, alternative connecting means could be substituted for particular requirements.)

Between a first pipe-receiving portion 5 of the body 1 (adjacent to the connecting means 4) and a second portion 8, the bore 2 is stepped radially outwards to form an internal annular shoulder 6. In the second portion 8 the bore extends rearwardly from the shoulder 6 to an open end 7 of the body through which an end portion of a pipe can be inserted into the body.

The connector is particularly adapated to be used with pipe in the form of flexible corrugated tubular conduit in the provision of trunking for electrical wiring. The corrugated form of such conduit provides spaced circumferentially-extending ridges all along the length of the conduit.

At least one sprung catch arrangement, comprising a resiliently displaceable finger 10, is arranged on the second portion 8 of the body. The finger is accommodated within an opening 9 in the body and extends from a root portion 11 which is joined to the body 1 by two oppositely projecting lateral mounting elements 15 at the open end of the body. The finger 10 extends within the opening 9 in a direction generally axially of the body from its root portion 11 to a free-end portion bearing a projection 12. The projection 12 projects radially inwardly of the body 1 into the bore 2 and is adapted to engage behind an adjacent ridge on a conduit (not shown) inserted into the connector. The projection 12 has a front end face 14 and a rear end face 13, the end faces 13 and 14 each being inclined forwardly. Side portions 20 of the projection 12 are convergent towards a tip 21 of the projection.

The two mounting elements 15 provide for the free-end portion of the finger to be resiliently displaceable radially of the body, the finger being resiliently pivotable about a transvrse axis 17 through elastic torsional strain in the mounting elements. A slot 16 is located in the finger forwardly of the mounting elements to receive a screwdriver or other tool; this enables the finger to be pivoted to move the projection 12 out of engagement with an inserted conduit, so to facilitate insertion and removal of the conduit if required. The slot 16 may in an alternative form be located directly between the mounting elements rather than forwardly of them.

In another embodiment an extension portion 22 (Figure 1) may extend in the opposite direction from the finger 10 to enable the finger to be pivoted outwardly by inward manual depression of the extension. The extension 22 could be accommodated within the length of the body 1 but preferably extends rearwardly beyond the open end 7 of the connector as shown in Figure 1.

The connector can be provided with sealing means acting between the inside of the body 1 and the outside of an inserted conduit. To that end, the bore 2 in the first portion 5 of the body may be tapered to provide a sealing fit for the end of the conduit. Alternatively an O ring or other sealing means may be incorporated.

The connector shown is provided with one conduit-retaining finger 10. In other embodiments a plurality of such fingers may be provided, preferably uniformly distributed about the axis of the connector; for example, in a connector having a bore diameter of 5cm it may be appropriate to have four fingers provided equi-spaced at 90° intervals around the connector.

The connector is made as a unitary moulding of a suitable plastics material such as nylon 6. Alternatively, a catch-providing component comprising a supporting portion, mounting elements and a finger may be formed as a separate unitary plastics moulding to be secured in a body moulding.

In use of the connector, an end portion of a conduit is pushed in through the open end 7. The inclination of the rear face 13 of the projection 12 on the finger 10 facilitates outwards displacement of the finger as ridges on the conduit are pushed forwards past the projection. When the conduit is fully inserted, the projection 12 engages behind an adjacent ridge, the inclination of the front face 14 ensuring retention of the conduit in the connector against normal pull-off loads.

The convergent form of the side portions 20 of the projection can minimise shear stress in this area.

Limited pivoting of the finger causes only elastic torsional strain in the mounting elements, the finger so being resiliently mounted for temporary displacement of the projection 12 as ridges are pushed past during insertion of the conduit. Greater displacement of the finger can cause the plastics material of the mounting elements to behave in a viscous manner, so that when the force causing pivoting is removed the finger remains in the position to which it has been pivoted; the finger can be returned subsequently to its original position. Advantage may be taken of this viscous behaviour of the material to move the finger aside to a pivoted-out position in which it will remain whilst a conduit is inserted or removed from the connector. This behaviour can be particularly advantageous when a conduit is to be disconnected from a connector having a plurality of fingers and able to retain the

connector against a high pull-off load. It may be appropriate for larger connectors, having a plurality of fingers, to be supplied with the fingers in a pivoted-out position.

Claims

1. A moulded plastics pipe connector for fitting to an end portion of a pipe and comprising a tubular body (1) arranged to receive the pipe and at least one sprung catch arranged on the body to engage the pipe for retention of the pipe, the sprung catch comprising a finger (10) presenting a free-end portion which is resiliently displaceable radially of the body and which bears a projection (12) for engagement behind a circumferential ridge of the pipe to lock the pipe into the connector, characterised in that a root portion (11) of the finger is connected to the body by means of lateral mounting elements (15) which provide for the finger to be resiliently pivotable about a transverse axis through elastic torsional strain in the elements.

2. A pipe connector according to claim 1 in which the finger (10) is accommodated within an opening (9) in the tubular body (1).

3. A pipe connector according to either of claims 1 and 2 in which the finger (10) extends generally axially of the body from its root portion (11) to its free-end portion.

4. A pipe connector according to claim 3 in which the root portion (11) of the finger is positioned at or adjacent to an open end (7) of the tubular body through which the pipe is introduced, the finger extending along the body in the direction away from the open end.

5. A pipe connector according to any one of claims 1 to 4 in which the sprung catch comprises an extension portion (22) which extends from the root portion (11) of the finger in the direction away from the free-end portion bearing the projection (12), the extension being depressible to pivot the finger radially outwardly of the body.

6. A pipe connector according to any one of claims 1 to 5 in which the body (1), the mounting elements (15) and the finger (10) are formed as a unitary plastics moulding.

7. A pipe connector according to any one of claims 1 to 6 comprising a plurality of such sprung catches distributed around the body (1) to engage the pipe.

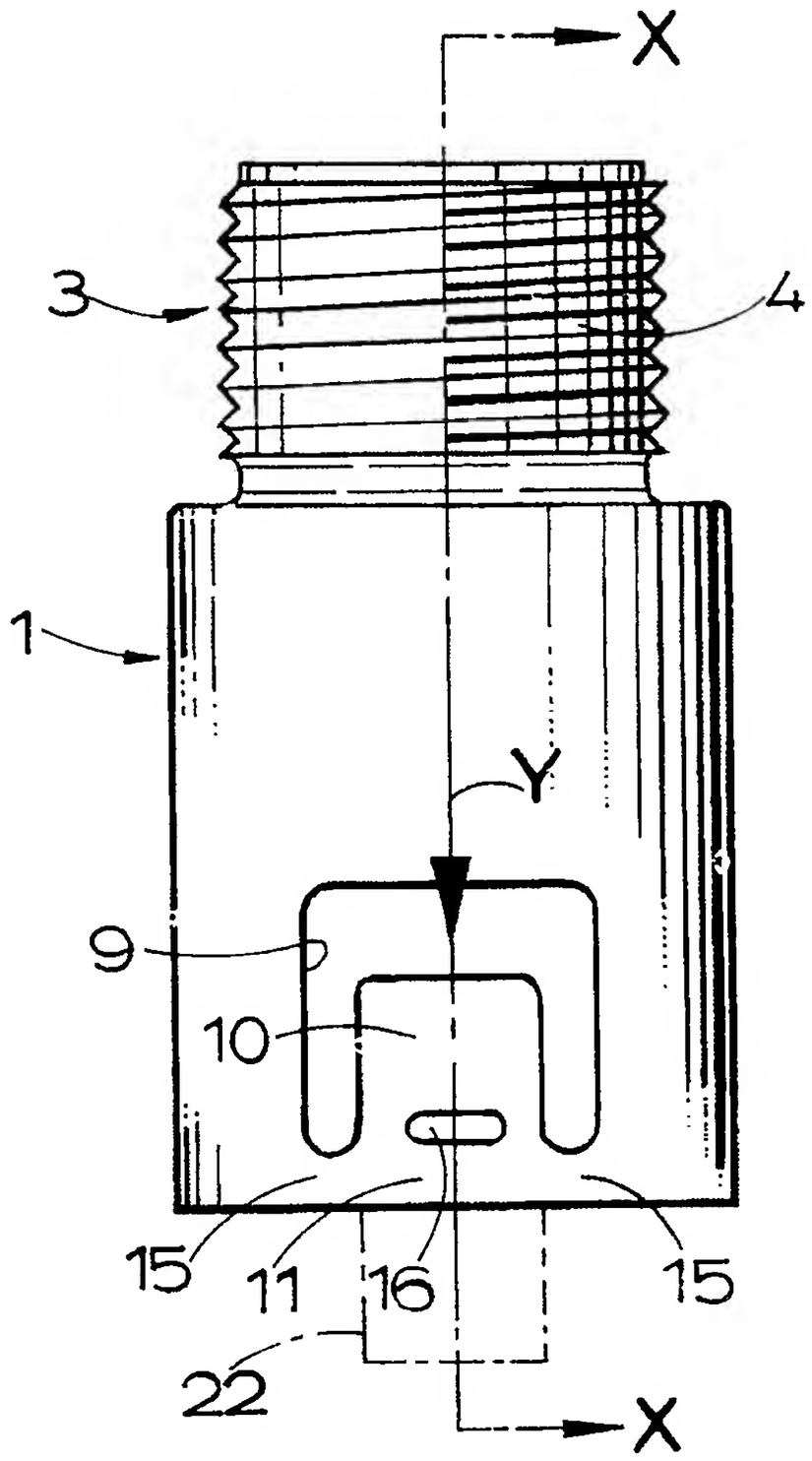

FIG.1.

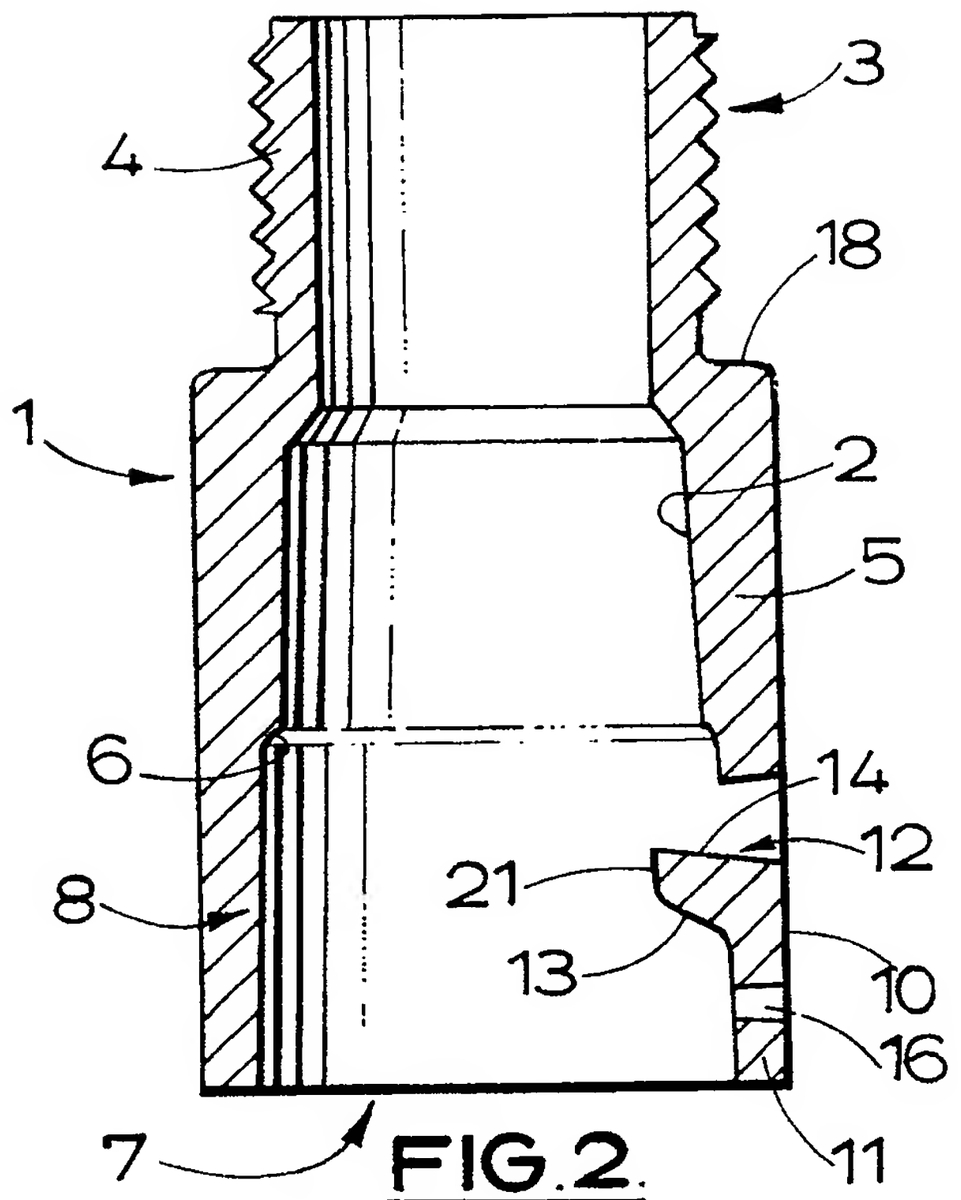

FIG.2.

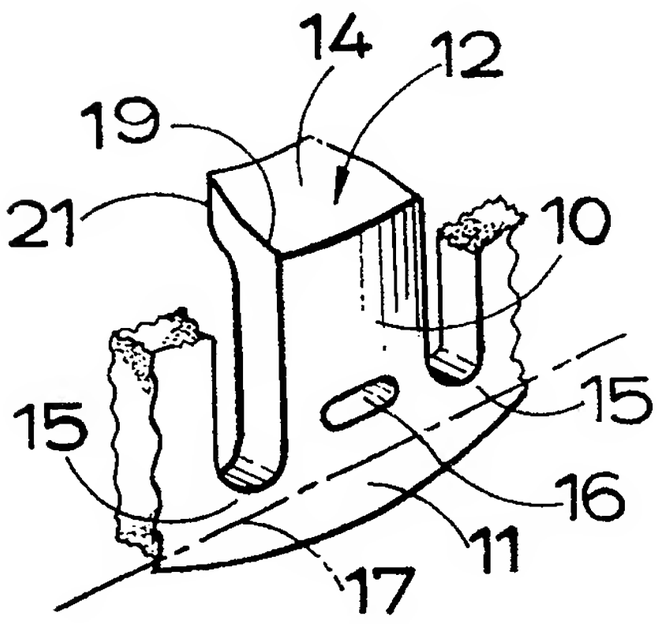

FIG.3.

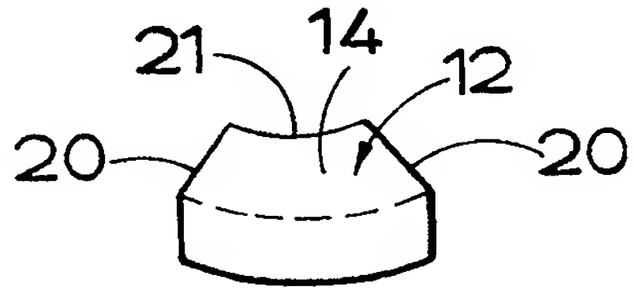

FIG.4.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 90 30 9167

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	US-A-4 248 459 (PATE) * column 10, line 54 - column 11, line 48; figures *	1	F 16 L 37/084 F 16 L 37/133
A	US-A-3 250 551 (DRAUDT) * figures *	1	
A	DE-U-8 706 430 (ELBI INTERNATIONAL LTD) * page 6, line 21 - page 7, line 24; figures 4, 5 *	1	
A	WO-A-8 901 109 (PETTY) * page 6, line 3 - page 7, line 32; figures 1, 2 *	1,2,4,6,7	
A	EP-A-0 031 022 (VOGES) * page 8, lines 16 - 21; figures *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F 16 L

The present search report has been drawn up for all claims

Place of search	Date of completion of search	Examiner
The Hague	31 October 90	HUBEAU M.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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